



**INDIANA
MICHIGAN
POWER**

A unit of American Electric Power

Indiana Michigan Power
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September 13, 2005

AEP:NRC:5055-09
10 CFR 50.55a

Docket No. 50-315

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

**Donald C. Cook Nuclear Plant Unit 1
PROPOSED ALTERNATIVE TO THE
AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE, SECTION XI
REPAIR REQUIREMENTS**

- References:
1. Letter from J. N. Jensen, Indiana Michigan Power Company (I&M), to Nuclear Regulatory Commission (NRC) Document Control Desk, "Donald C. Cook Nuclear Plant Units 1 and 2, NRC Bulletin 2004-01, Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors, Sixty-Day Response," AEP:NRC:4054-07, Accession Number ML042160342, dated July 26, 2004.
 2. Letter from D. P. Fadel, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1, Revision to Proposed Alternative to the American Society of Mechanical Engineers Code, Section XI Repair Requirements," AEP:NRC:5055-04, Accession Number ML051290122, dated April 22, 2005.

Pursuant to 10 CFR 50.55a(a)(3)(i), Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant Units 1 and 2, is proposing alternatives to the repair requirements and the inspection requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code).


During the Unit 1 Cycle 20 refueling outage, I&M personnel, in accordance with the Reference 1 response, conducted nondestructive examinations of the pressurizer Alloy 82/182 welds. During the examination of the pressurizer safety nozzle to safety valve inlet line weld (1-PRZ-23), a flaw was detected. I&M repaired this weld using a weld overlay process described in ASME Code Case N-504-2 rather than the standard ASME Code, Section XI required repair. In Reference 2, I&M, in accordance with 10 CFR 50.55a(a)(3)(i), proposed an alternative to the provisions of the ASME Code, Section XI, for 1-PRZ-23. The repair to 1-PRZ-23 encompassed an adjacent stainless steel weld (1-RC-9-01F) in which a flaw was detected during the examination of the overlay. I&M subsequently determined that the flaw was acceptable without repair, and relief to seek structural

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replacement of weld 1-RC-9-01F was not requested at that time. However, future inspections of weld 1-RC-9-01F are not feasible utilizing demonstrated inspection techniques currently available. As the overlay encompasses weld 1-RC-9-01F, I&M is proposing an alternative to the provisions of the ASME Code, Section XI, to allow the existing overlay to be credited as a structural replacement for weld 1-RC-9-01F, which would eliminate the need for future inspections of this weld. The attachment to this letter provides I&M's proposed alternative and the basis for I&M's conclusion that the proposed alternative, which is similar to the alternative proposed by I&M in Reference 2, provides an acceptable level of quality and safety.

I&M requests approval of the proposed alternative by January 31, 2006. This letter contains no new commitments. Should you have any questions, please contact Mr. John A. Zwolinski, Director of Safety Assurance at (269) 466-2428.

Sincerely,



Daniel P. Fadel
Engineering Vice President

RV/rdw

Attachment: 10 CFR 50.55a Relief Request – ISIR-17, Proposed Alternative to American Society of Mechanical Engineers Code (ASME Code) in Accordance with 10 CFR 50.55a(a)(3)(i)

- c: R. Aben – Department of Labor and Economic Growth
- J. L. Caldwell – NRC Region III
- K. D. Curry – AEP Ft. Wayne, w/o attachment
- J. T. King – MPSC, w/o attachment
- MDEQ – WHMD/HWRPS, w/o attachment
- NRC Resident Inspector
- D. W. Spaulding – NRC Washington DC

Attachment to AEP:NRC:5055-09

10 CFR 50.55a Relief Request – ISIR-17

Proposed Alternative to American Society of Mechanical Engineers Code (ASME Code) in
Accordance with 10 CFR 50.55a(a)(3)(i)

1.0 ASME CODE COMPONENTS AFFECTED

Code Class: Class 1
Reference: ASME Code, Section XI, 1989, no addenda
ASME Code Case N-504-2
ASME Code Case N-416-1
ASME Section III, 1965 Edition, Winter 1966 Addenda
ASME Section III, 1992 Edition
Examination Categories: B-J
Item Number: B9.11
Description: Alternative Welded Replacement For the Pressurizer Safety
Nozzle Safe End To Safety Valve Inlet Line
Component Number: 1-RC-9-01F

2.0 APPLICABLE CODE EDITION AND ADDENDA

ASME Code, Section XI 1989 Edition, no addenda

3.0 APPLICABLE CODE REQUIREMENTS

IWA-4000 and IWB-4000 of ASME Code, Section XI require repairs to be performed in accordance with the Owner's Design Specification and the original construction Code of the component or system.

4.0 REASON FOR REQUEST

During the Unit 1 Cycle 20 refueling outage, an ultrasonic examination of a weld repair that encompassed weld 1-RC-9-01F identified a circumferential flaw (see Figure 1) within the stainless steel weld material. The flaw was most likely related to original construction. Weld 1-RC-9-01F is a safe end to elbow weld containing stainless steel weld material connecting an austenitic stainless steel safe end to a stainless steel elbow. The ASME Code acceptable repair method would require complete removal of the flaw or acceptance via an ASME Code, Section XI, Paragraph IWB-3600 evaluation. Westinghouse Electric Company LLC performed an evaluation of the flaw for Indiana Michigan Power Company (I&M) in accordance with the provisions of ASME Code, Section XI, Paragraph IWB-3640, and concluded that the flaw size was acceptable for continued use and no repair was required (Reference 1). However, because weld 1-RC-9-01F is covered by a newly installed weld overlay (installed to repair weld 1-PRZ-23, Reference 2) future inspections of weld 1-RC-9-01F are not feasible. For this reason, I&M proposes that the weld overlay be credited as an acceptable replacement for weld 1-RC-9-01F.

Pursuant to 10 CFR 50.55a(a)(3)(i), the alternative is requested on the basis that the alternative provides an acceptable level of quality and safety.

5.0 PROPOSED ALTERNATIVE AND BASIS FOR USE

A full structural weld overlay replacement is proposed for safe end to elbow weld 1-RC-9-01F. An IWB-3640 analysis was performed for the indication identified in the weld fusion zone of 1-RC-9-01F. The analysis concluded that the indication will not have any appreciable growth over the life of the component. The weld overlay design for 1-PRZ-23 also encompassed weld 1-RC-9-01F and provided a full structural overlay weld for 1-RC-9-01F in addition to the full structural weld overlay for 1-PRZ-23. In effect, this is one overlay that encompasses two welds. The overlay for 1-RC-9-01F precludes the use of a currently qualified ultrasonic technique for the original weld since there is not a demonstrated ultrasonic technique for examining the required volume of a B-J weld (i.e., the inner 1/3) that is covered by an overlay. Since 1-RC-9-01F is no longer considered an ASME Section XI Category B-J weld, I&M proposes to examine the overlay for 1-RC-9-01F according to the requirements of ASME Code Case N-504-2 and the Electric Power Research Institute Performance Demonstration Initiative (PDI) Program for implementation of Appendix VIII, Supplement 11 requirements. The use of PDI in lieu of Appendix VIII, Supplement 11 requirements for overlay welds was approved for use at Donald C. Cook Nuclear Plant Unit 1 in Reference 3.

The weld overlay has been designed consistent with the requirements of ASME Code Case N-504-2, "Alternative Rules for Repair of Classes 1, 2, and 3 Austenitic Stainless Steel Piping," with the exceptions noted below. The weld overlay extends around the full circumference of the safe end to elbow weld location as required by ASME Code Case N-504-2. The specific thickness and length have been computed according to the guidance provided in ASME Code Case N-504-2.

ASME Code Case N-504-2 was approved for generic use in Regulatory Guide 1.147, Revision 13, and was developed for austenitic stainless steel material. An alternate application for nickel-based materials is proposed due to the specific configuration of the subject weld. Therefore, the methodology of Code Case N-504-2 was followed with the following exceptions:

1. Paragraph (b) of ASME Code Case N-504-2 requires that the reinforcement weld material shall be low carbon (0.035 percent (%) maximum) austenitic stainless steel. In lieu of the stainless steel weld material, a consumable welding wire highly resistant to primary water stress corrosion cracking (PWSCC) has been selected for the overlay weld material. This material is a nickel-based alloy weld material, commonly referred to as Alloy 52, which is austenitic and has ductile properties and toughness similar to austenitic stainless steel piping welds at pressurized water reactor temperature. The overlay was applied using a machine gas tungsten arc welding process and limited manual gas tungsten arc welding. Alloy 52 contains about 30% chromium that imparts excellent corrosion resistance to this material. This material is suitable for welding over the carbon steel nozzle, Alloy 82/182 weld material, stainless steel safe end, stainless

steel weld material, and stainless steel piping as it is compatible with the existing weldment and base materials. Accordingly, this alternative provides an acceptable level of safety and quality.

2. Paragraph (e) of ASME Code Case N-504-2 requires as-deposited delta ferrite measurements of at least 7.5 Ferrite Number for the weld reinforcement. Delta ferrite measurements were not performed for this overlay because the deposited Alloy 52 is 100% austenitic and contains no delta ferrite due to the high nickel composition (approximately 60% nickel). Accordingly, this alternative provides an acceptable level of safety and quality.
3. Paragraph (h) of ASME Code Case N-504-2 requires a system hydrostatic test of the completed repair if the flaw(s) penetrated the original pressure boundary or if there is any observed indication of the flaw penetrating the pressure boundary during repair. In lieu of hydrostatic testing, a system pressure test and an ultrasonic examination of the weld overlay were performed in accordance with the Third Interval Inservice Inspection (ISI) Program and ASME Code Case N-416-1. This alternative requirement is sufficient to demonstrate that the overlay is of adequate quality to ensure the pressure boundary integrity. Accordingly, this alternative provides an acceptable level of safety and quality.

The repair, pre-service inspection, and ISI examination of the weld overlay replacement were performed in accordance with the ISI Program, NUREG-0313, Revision 2, Generic Letter 88-01, and approved plant procedures as specified by the ISI Repair/Replacement Program. The weld overlay was examined in accordance with the industry-developed PDI procedure. As required by ASME Code Case N-416-1 (Alternative Pressure Test Requirement for Welded Repairs or Installation of Replacement Items by Welding, Class 1, 2, and 3), nondestructive examination was performed to ASME Code, Section III, 1992 Edition, Subsection NB requirements to the extent practical. A description of the required examinations was provided in Reference 2 for the weld overlay and the underlying base material associated with weld 1-PRZ-23. The required examinations are the same for the weld overlay and the underlying base material associated with weld 1-RC-9-01F. The acceptance criterion for the volumetric examinations was ASME Code, Section XI, Paragraph IWB-3514, "Standards for Examination Category B-F, Pressure Retaining Dissimilar Metal Welds, and Category B-J, Pressure Retaining Welds In Piping."

The use of overlay material that provides excellent resistance to PWSCC develops an effective barrier to flaw extension by corrosion processes. The design of the overlay for the nozzle-to-safe end weldment (1-PRZ-23) and its extension over the safe end-to-piping weldment (1-RC-9-01F) uses methods that are standard in the industry. There are no new or different approaches in this overlay design that are considered first of a kind or inconsistent with previous approaches. The overlay was designed as a full structural overlay in accordance with ASME Code Case N-504-2. I&M concludes that the alternative repair approach described above presents an acceptable level of quality and safety to satisfy the requirements of 10 CFR 50.55a(a)(3)(i).

6.0 DURATION OF THE PROPOSED ALTERNATIVE

This alternative repair is requested for the remainder of the Third Ten-Year Inspection Interval.

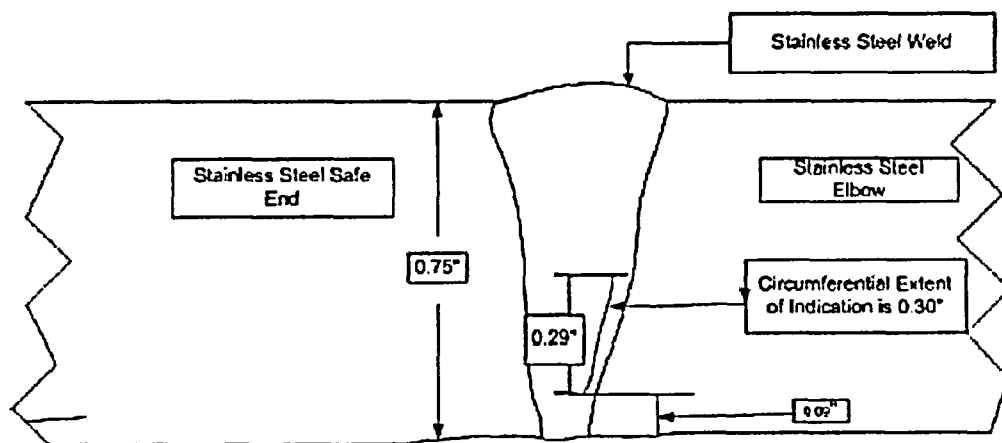
7.0 PRECEDENT

Similar requests have been approved for the Three Mile Island, Unit 1, Nuclear Station (Reference 4) and the Cooper Nuclear Station (Reference 5).

8.0 REFERENCES

1. Letter from D. P. Fadel, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1, Pressurizer Safety Nozzle Stainless Steel Safe End Weld Circumferential Flaw Evaluation," AEP:NRC:5055-06, Accession Number ML051650266, dated June 3, 2005.
2. Letter from D. P. Fadel, I&M, to NRC Document Control Desk, "Donald C. Cook Nuclear Plant Unit 1, Revision to Proposed Alternative to the American Society of Mechanical Engineers Code, Section XI Repair Requirements," AEP:NRC:5055-04, Accession Number ML051290122, dated April 22, 2005.
3. Letter L. Raghavan, NRC, to M. K. Nazar, I&M, "Donald C. Cook Nuclear Plant, Unit 1 - Alternative to Repair Requirements of Section XI of the American Society of Mechanical Engineers Code (TAC No. MC6751)," Accession Number ML051720006, dated June 27, 2005.
4. Letter from Richard J. Laufer, NRC, to Christopher M. Crane, AmerGen Energy Company, "Three Mile Island Nuclear Station, Unit 1 (TMI-1) Request for Relief from Flaw Removal, Heat Treatment, and Nondestructive Examination Requirements for the Third 10-Year Inservice Inspection (ISI) Interval (TAC No. MC1201)," Accession Number ML041670510, dated July 21, 2004.
5. Letter from Allen G. Howe, NRC, to Randall K. Edington, Nebraska Public Power District, "Cooper Nuclear Station - Re: Request RI-35 for Relief from the Requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) (TAC No. MC4954)," Accession Number ML050670165, dated March 4, 2005.

FIGURE 1



Cook Nuclear Plant
1-RC-9-01F